

THE ASTROPHYSICAL JOURNAL  
CONTENTS OF VOLUME 514, PART 1

1999 MARCH 20, NUMBER 1

	<i>Page</i>
WHERE ARE THE BARYONS? <i>Renyue Cen &amp; Jeremiah P. Ostriker</i>	1
WEAKLY NONLINEAR CLUSTERING FOR ARBITRARY EXPANSION HISTORIES <i>Marc Kamionkowski &amp; Ari Buchalter</i>	7
INTERFEROMETRIC OBSERVATION OF COSMIC MICROWAVE BACKGROUND ANISOTROPIES <i>Martin White, John E. Carlstrom, Mark Dragovan, &amp; William L. Holzapfel</i>	12
GRAVITATIONAL LENSING AND DARK STRUCTURES <i>Yu-Chung N. Cheng &amp; Lawrence M. Krauss</i>	25
A NARROWBAND IMAGING SEARCH FOR [O III] EMISSION FROM GALAXIES AT $z > 3$ <i>Harry I. Teplitz, Matthew A. Malkan, &amp; Ian S. McLean</i>	33
A STATISTICAL STUDY OF REST-FRAME OPTICAL EMISSION PROPERTIES IN LUMINOUS QUASARS AT $2.0 \leq z \leq 2.5$ <i>D. H. McIntosh, M. J. Rieke, H.-W. Rix, C. B. Foltz, &amp; R. J. Weymann</i>	40
COUNTERROTATING NUCLEAR DISKS IN ARP 220 <i>K. Sakamoto, N. Z. Scoville, M. S. Yun, M. Crosas, R. Genzel, &amp; L. J. Tacconi</i>	68
EARLY EVOLUTION OF DISK GALAXIES: FORMATION OF BULGES IN CLUMPY YOUNG GALACTIC DISKS <i>Masafumi Noguchi</i>	77
EVOLUTIONARY SYNTHESIS MODELING OF RED SUPERGIANT FEATURES IN THE NEAR-INFRARED <i>Livia Origlia, Jeffrey D. Goldader, Claus Leitherer, Daniel Schaerer, &amp; Ernesto Oliva</i>	96
TIDAL SHOCKING BY EXTENDED MASS DISTRIBUTIONS <i>Oleg Y. Gnedin, Lars Hernquist, &amp; Jeremiah P. Ostriker</i>	109
EVOLUTIONARY STATUS OF DWARF "TRANSITION" GALAXIES <i>Patricia M. Knezek, Kenneth R. Sembach, &amp; John S. Gallagher III</i>	119
THE ISOLATED ELLIPTICAL GALAXY NGC 1132: EVIDENCE FOR A MERGED GROUP OF GALAXIES? <i>John S. Mulchaey &amp; Ann I. Zabludoff</i>	133
HIGH-ENERGY EMISSION FROM THE TeV BLAZAR MARKARIAN 501 DURING MULTIWAVELENGTH OBSERVATIONS IN 1996 <i>J. Kataoka, J. R. Mattox, J. Quinn, H. Kubo, F. Makino, T. Takahashi, S. Inoue, R. C. Hartman, G. M. Madejski, P. Sreekumar, &amp; S. J. Wagner</i>	138
A FLUX-LIMITED SAMPLE OF BRIGHT CLUSTERS OF GALAXIES FROM THE SOUTHERN PART OF THE ROSAT ALL-SKY SURVEY: THE CATALOG AND $\log N$ - $\log S$ <i>S. De Grandi, H. Böhringer, L. Guzzo, S. Molendi, G. Chincarini, C. Collins, R. Crudeci, D. Neumann, S. Schindler, P. Schuecker, &amp; W. Voges</i>	148
X-RAY IRON LINE REVERBERATION FROM BLACK HOLE ACCRETION DISKS <i>Christopher S. Reynolds, Andrew J. Young, Mitchell C. Begelman, &amp; Andrew C. Fabian</i>	164
FLARES FROM THE TIDAL DISRUPTION OF STARS BY MASSIVE BLACK HOLES <i>Andrew Ulmer</i>	180
A HIGH-RESOLUTION VLA AND OPTICAL STUDY OF NGC 604 <i>E. Churchwell &amp; W. M. Goss</i>	188
HUBBLE SPACE TELESCOPE IMAGES AND SPECTRA OF THE REMNANT OF SN 1885 IN M31 <i>Robert A. Fesen, Christopher L. Gerardy, Kevin M. McLin, &amp; Andrew J. S. Hamilton</i>	195
MASSIVE STARS IN THE QUINTUPLET CLUSTER <i>Donald F. Figer, Ian S. McLean, &amp; Mark Morris</i>	202

	Page
RADIO POLARIMETRIC IMAGING OF THE INTERSTELLAR MEDIUM: MAGNETIC FIELD AND DIFFUSE IONIZED GAS STRUCTURE NEAR THE W3/W4/W5/HB 3 COMPLEX <i>A. D. Gray, T. L. Landecker, P. E. Dewdney, A. R. Taylor, A. G. Willis, &amp; M. Normandeau</i>	221
ULTRACOMPACT H II REGIONS WITH EXTENDED RADIO-CONTINUUM EMISSION <i>Stanley E. Kurtz, Alan M. Watson, Peter Hofner, &amp; Birgit Otte</i>	232
LONG-TERM SCINTILLATION STUDIES OF PULSARS. II. REFRACTIVE EFFECTS AND THE SPECTRUM OF PLASMA DENSITY FLUCTUATIONS <i>N. D. Ramesh Bhat, Yashwant Gupta, &amp; A. Pramesh Rao</i>	249
LONG-TERM SCINTILLATION STUDIES OF PULSARS. III. TESTING THEORETICAL MODELS OF REFRACTIVE SCINTILLATION <i>N. D. Ramesh Bhat, A. Pramesh Rao, &amp; Yashwant Gupta</i>	272
DISK AND OUTFLOW IN CEPHEUS A-HW2: INTERFEROMETRIC SiO AND HCO <sup>+</sup> OBSERVATIONS <i>José F. Gómez, Annela I. Sargent, José M. Torrelles, Paul T. P. Ho, Luis F. Rodríguez, Jorge Cantó, &amp; Guido Garay</i>	287
A DETAILED ANALYSIS OF THE STELLAR AND NEBULAR IUE SPECTRUM OF THE PECULIAR "O VI SEQUENCE" PLANETARY NEBULA NGC 40 <i>Walter A. Feibelman</i>	296
IMPROVING PREDICTIONS FOR HELIUM EMISSION LINES <i>Robert A. Benjamin, Evan D. Skillman, &amp; Derck P. Smits</i>	307
ON THE AZIMUTHAL STRUCTURE OF THERMAL CONVECTION IN CIRCUMSTELLAR DISKS <i>H. H. Klahr, Th. Henning, &amp; W. Kley</i>	325
TIDALLY INDUCED GAP FORMATION IN PROTOSTELLAR DISKS: GAP CLEARING AND SUPPRESSION OF PROTOPLANETARY GROWTH <i>G. Bryden, Xingming Chen, D. N. C. Lin, Richard P. Nelson, &amp; John C. B. Papaloizou</i>	344
MAGNETIC PROPELLER OUTFLOWS <i>R. V. E. Lovelace, M. M. Romanova, &amp; G. S. Bisnovatyi-Kogan</i>	368
X-RAY SHOTS OF CYGNUS X-1 <i>Y. X. Feng, T. P. Li, &amp; L. Chen</i>	373
RADIO AND X-RAY OBSERVATIONS OF THE 1998 OUTBURST OF THE RECURRENT X-RAY TRANSIENT 4U 1630-47 <i>R. M. Hjellming, M. P. Rupen, A. J. Mioduszewski, E. Kuulkers, M. McCollough, B. A. Harmon, M. Buxton, R. Sood, A. Tzioumis, D. Rayner, S. Dieters, &amp; P. Durouchoux</i>	383
FRAME DRAGGING AND OTHER PRECESSIONAL EFFECTS IN BLACK HOLE PULSAR BINARIES <i>N. Wex &amp; S. M. Kopeikin</i>	388
PRECISE SPECTROPOLARIMETRIC MEASUREMENTS OF MAGNETIC FIELDS ON SOME SOLAR-LIKE STARS <i>S. I. Plachinda &amp; T. N. Tarasova</i>	402
STRUCTURE AND EVOLUTION OF NEARBY STARS WITH PLANETS. I. SHORT-PERIOD SYSTEMS <i>Eric B. Ford, Frederic A. Rasio, &amp; Alison Sills</i>	411
USING TEMPORAL VARIATIONS OF THE NONTHERMAL REDSHIFTED Ly $\alpha$ EMISSION TO DEDUCE PROPERTIES OF PROTON BEAMS INJECTED INTO A STELLAR ATMOSPHERE <i>Jeffrey W. Brosius &amp; Bruce E. Woodgate</i>	430
SLOW MAGNETOSONIC WAVES IN CORONAL PLUMES <i>L. Ofman, V. M. Nakariakov, &amp; C. E. DeForest</i>	441
THE GRANULAR MAGNETIC FIELDS OF THE QUIET SUN <i>Haosheng Lin &amp; Thomas Rimmele</i>	448
EVOLUTION OF ERUPTIVE FLARES. II. THE OCCURRENCE OF LOCALLY ENHANCED RESISTIVITY <i>Tetsuya Magara &amp; Kazunari Shibata</i>	456
THE SOLAR FLARE SOFT X-RAY DIFFERENTIAL EMISSION MEASURE AND THE NEUPERT EFFECT AT DIFFERENT TEMPERATURES <i>James M. McTiernan, George H. Fisher, &amp; Peng Li</i>	472
HARD AND SOFT X-RAY OBSERVATIONS OF OCCULTED AND NONOCCULTED SOLAR LIMB FLARES <i>John T. Mariska &amp; James M. McTiernan</i>	484
ALFVÉN WAVE MODEL OF SPICULES AND CORONAL HEATING <i>Takahiro Kudoh &amp; Kazunari Shibata</i>	493
A MULTIDIMENSIONAL CODE FOR ISOTHERMAL MAGNETOHYDRODYNAMIC FLOWS IN ASTROPHYSICS <i>Jongsoo Kim, Dongsu Ryu, T. W. Jones, &amp; Seung Soo Hong</i>	506

# CONTENTS

v

	Page
QUANTUM-MECHANICAL STUDY OF RO-VIBRATIONAL TRANSITIONS IN H <sub>2</sub> INDUCED BY He ATOMS <i>N. Balakrishnan, R. C. Forrey, &amp; A. Dalgarno</i>	520
REACTION OF H ATOMS WITH SOLID C <sub>2</sub> H <sub>4</sub> AND C <sub>2</sub> H <sub>6</sub> AT 13 K <i>Kenzo Hiraoka, Kazuyosi Yamamoto, Yoshihide Kihara, Toshikazu Takayama, &amp; Tetsuya Sato</i>	524
ABSTRACTS OF THE ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES, 1999 APRIL	
THE CIA REDSHIFT SURVEY: DATA FOR THE SOUTH GALACTIC CAP <i>John P. Huchra, Michael S. Vogeley, &amp; Margaret J. Geller</i>	529
CHEMICAL ABUNDANCES OF THE DAMPED Ly $\alpha$ SYSTEMS AT $z > 1.5$ <i>Jason X. Prochaska &amp; Arthur M. Wolfe</i>	529
COMPACT NUCLEI IN GALAXIES AT MODERATE REDSHIFT. I. IMAGING AND SPECTROSCOPY <i>Vicki L. Sarajedini, Richard F. Green, Richard E. Griffiths, &amp; Kavan Ratnatunga</i>	530
PHOTOMETRIC PROPERTIES OF KISO ULTRAVIOLET-EXCESS GALAXIES IN THE LYNX-URSA MAJOR REGION <i>Tsutomu T. Takeuchi, Akihiko Tomita, Kouichiro Nakanishi, Takako T. Ishii, Ikuru Iwata, &amp; Mamoru Saitō</i>	530
A THREE-DIMENSIONAL DIAGNOSTIC DIAGRAM FOR SEYFERT 2 GALAXIES: PROBING X-RAY ABSORPTION AND COMPTON THICKNESS <i>L. Bassani, M. Dadina, R. Maiolino, M. Salvati, G. Risaliti, R. Della Ceca, G. Matt, &amp; G. Zamorani</i>	531
LONG-TERM SCINTILLATION OF PULSARS. I. OBSERVATIONS AND BASIC RESULTS <i>N. D. Ramesh Bhat, A. Pramesh Rao, &amp; Yashwant Gupta</i>	531
ROLES OF HYPERONS IN NEUTRON STARS <i>Shmuel Balberg, Itamar Lichtenstadt, &amp; Gregory B. Cook</i>	532
NEAR-INFRARED AND ULTRAVIOLET SPECTROPHOTOMETRY OF SYMBIOTIC NOVAE <i>Richard J. Rudy, Steven R. Meier, George S. Rossano, David K. Lynch, R. C. Puetter, &amp; Peter Erwin</i>	532
DOPPLER IMAGERY OF THE SPOTTED RS CANUM VENATICORUM STAR HR 1099 (V711 TAURI) FROM 1981 TO 1992 <i>Steven S. Vogt, Artie P. Hatzes, Anthony A. Misch, &amp; M. Kürster</i>	532
WEIGHTED OSCILLATOR STRENGTHS AND LIFETIMES FOR THE Si VI SPECTRUM <i>L. H. Coutinho &amp; A. G. Trigueiros</i>	533
1999 APRIL 1, NUMBER 2	
CONSTRAINTS FROM THE HUBBLE DEEP FIELD ON HIGH-REDSHIFT QUASAR MODELS <i>Zoltán Haiman, Piero Madau, &amp; Abraham Loeb</i>	535
ON MEASURING NEBULAR CHEMICAL ABUNDANCES IN DISTANT GALAXIES USING GLOBAL EMISSION-LINE SPECTRA <i>Henry A. Kobulnicky, Robert C. Kennicutt, Jr., &amp; James L. Pizagno</i>	544
QUASAR-GALAXY AND AGN-GALAXY CROSS-CORRELATIONS <i>Héctor J. Martínez, Manuel E. Merchán, Carlos A. Valotto, &amp; Diego G. Lambas</i>	558
BIASING AND HIGH-ORDER STATISTICS FROM THE SOUTHERN-SKY REDSHIFT SURVEY <i>C. Benoist, A. Cappi, L. N. da Costa, S. Maurogordato, F. R. Bouchet, &amp; R. Schaeffer</i>	563
ULTRAVIOLET IMAGING POLARIMETRY OF NARROW-LINE RADIO GALAXIES <i>Todd Hurt, Robert Antonucci, Ross Cohen, Anne Kinney, &amp; Julian Krolik</i>	579
HUBBLE SPACE TELESCOPE OBSERVATIONS OF THE GRAVITATIONALLY LENSED CLOVERLEAF BROAD ABSORPTION LINE QSO H1413+1143: MODELING THE LENS <i>Kyu-Hyun Chae &amp; David A. Turnshek</i>	587
A WAVELET EXPLORATION OF THE Q0957+561A,B BRIGHTNESS RECORD <i>R. Schild</i>	598
ON THE EXTREME-ULTRAVIOLET EMISSION FROM GALAXY CLUSTERS <i>John S. Arabadjis &amp; Joel N. Bregman</i>	607
THE HUBBLE SPACE TELESCOPE KEY PROJECT ON THE EXTRAGALACTIC DISTANCE SCALE. XIX. THE DISCOVERY OF CEPHEIDS IN AND A NEW DISTANCE TO NGC 3198 <i>Daniel D. Kelson, Garth D. Illingworth, Abhijit Saha, John A. Graham, Peter B. Stetson, Wendy L. Freedman, Robert C. Kennicutt, Jeremy R. Mould, Laura Ferrarese, John P. Huchra, Barry F. Madore, Charles F. Prosser, Fabio Bresolin, Holland C. Ford, Brad K. Gibson, John G. Hoessel, Shaun M. G. Hughes, Lucas M. Macri, Shoko Sakai, &amp; N. A. Silbermann</i>	614
THE STARBURST-ACTIVE GALACTIC NUCLEUS CONNECTION IN ACTIVE GALAXIES: THE MASSIVE NUCLEAR STAR-FORMING DISK IN NGC 4303 <i>L. Colina &amp; S. Arribas</i>	637

RADIATIVE TRANSFER IN A CLUMPY UNIVERSE. III. THE NATURE OF COSMOLOGICAL IONIZING SOURCES <i>Piero Madau, Francesco Haardt, &amp; Martin J. Rees</i>	Page 648
OPTICAL VERSUS MID-INFRARED SPECTROSCOPIC CLASSIFICATION OF ULTRALUMINOUS INFRARED GALAXIES <i>Yoshiaki Taniguchi, Akira Yoshino, Youichi Ohyama, &amp; Shingo Nishiura</i>	660
HUBBLE SPACE TELESCOPE OBSERVATIONS OF THE LOCAL GROUP DWARF GALAXY LEO I <i>Carrie Gallart, Wendy L. Freedman, Mario Mateo, Cesare Chiosi, Ian B. Thompson, Antonio Aparicio, Gianpaolo Bertelli, Paul W. Hodge, Myung G. Lee, Edward W. Olszewski, Abhijit Saha, Peter B. Stetson, &amp; Nicholas B. Suntzeff</i>	665
HIGH-RESOLUTION INFRARED SPECTROSCOPY AND NUCLEAR CLUSTERS IN THE STARBURST GALAXY NGC 1614 <i>P. J. Puxley &amp; P. W. J. L. Brand</i>	675
A CUTOFF IN THE X-RAY FLUCTUATION POWER DENSITY SPECTRUM OF THE SEYFERT 1 GALAXY NGC 3516 <i>Rick Edelson &amp; Kirpal Nandra</i>	682
HYDRODYNAMIC SIMULATIONS OF COUNTERROTATING ACCRETION DISKS <i>O. A. Kuznetsov, R. V. E. Lovelace, M. M. Romanova, &amp; V. M. Chechetkin</i>	691
EVIDENCE FOR A MASSIVE BLACK HOLE IN THE S0 GALAXY NGC 4342 <i>Nicolas Cretton &amp; Frank C. van den Bosch</i>	704
COLLISIONAL STELLAR DYNAMICS AROUND MASSIVE BLACK HOLES IN ACTIVE GALACTIC NUCLEI <i>Kevin P. Rauch</i>	725
COMPACT NUCLEI IN GALAXIES AT MODERATE REDSHIFT. II. THEIR NATURE AND IMPLICATIONS FOR THE ACTIVE GALACTIC NUCLEUS LUMINOSITY FUNCTION <i>Vicki L. Sarajedini, Richard F. Green, Richard E. Griffiths, &amp; Kavan Ratnatunga</i>	746
HOT GAS HALO OF NGC 3923: CIRCULATION OF INTERGALACTIC MATTER <i>Shinji Sato &amp; Yuzuru Tawara</i>	765
ASCA OBSERVATIONS OF THE STARBURST-DRIVEN SUPERWIND GALAXY NGC 2146: BROADBAND (0.6–9 keV) SPECTRAL PROPERTIES <i>Roberto Della Ceca, Richard E. Griffiths, Timothy M. Heckman, Matthew D. Lehnert, &amp; Kimberley A. Weaver</i>	772
MODELING THE RADIAL ABUNDANCE DISTRIBUTION OF THE TRANSITION GALAXY NGC 1313 <i>Mercedes Mollá &amp; Jean-René Roy</i>	781
DARK MATTER AND THE CHEMICAL EVOLUTION OF IRREGULAR GALAXIES <i>L. Carigi, P. Colin, &amp; M. Peimbert</i>	787
SUPERNOVA REMNANTS IN THE MAGELLANIC CLOUDS. II. SUPERNOVA REMNANT BREAKOUTS FROM N11L AND N86 <i>Rosa Murphy Williams, You-Hua Chu, John R. Dickel, R. Chris Smith, Douglas K. Milne, &amp; P. Frank Winkler</i>	798
HIGH-VELOCITY CLOUDS: BUILDING BLOCKS OF THE LOCAL GROUP <i>Leo Blitz, David N. Spergel, Peter J. Teuben, Dap Hartmann, &amp; W. Butler Burton</i>	818
STELLAR METALLICITIES AND TYPE Ia SUPERNOVA RATES IN THE EARLY-TYPE GALAXY NGC 5846 FROM ROSAT AND ASCA OBSERVATIONS <i>A. Finoguenov, C. Jones, W. Forman, &amp; L. David</i>	844
TIME-INTEGRATED GAMMA-RAY BURST SYNCHROTRON SPECTRA FROM BLAST-WAVE/CLOUD INTERACTIONS <i>James Chiang</i>	856
A STATISTICAL TREATMENT OF THE GAMMA-RAY BURST "NO HOST GALAXY" PROBLEM. II. ENERGIES OF STANDARD CANDLE BURSTS <i>David L. Band, Dieter H. Hartmann, &amp; Bradley E. Schaefer</i>	862
MICROLENS PARALLAXES WITH SIRTf <i>Andrew Gould</i>	869
SPECTROSCOPIC OBSERVATIONS OF THE PLANETARY NEBULA 6818 <i>Siek Hyung, Lawrence H. Aller, &amp; Walter A. Feibelman</i>	878
THE R AQUARI JET IN HINDSIGHT <i>J. M. Hollis, R. Bertram, R. M. Wagner, &amp; C. O. Lampland</i>	895
AMMONIA ABSORPTION TOWARD THE ULTRACOMPACT H II REGIONS G45.12+0.13 AND G45.47+0.05 <i>Peter Hofner, Sarah Peterson, &amp; Riccardo Cesaroni</i>	899

# CONTENTS

vii

WIND INHOMOGENEITIES IN WOLF-RAYET STARS. II. INVESTIGATION OF EMISSION-LINE PROFILE VARIATIONS <i>Sébastien Lépine &amp; Anthony F. J. Moffat</i>	Page 909
IS U AQUARI A THORNE-ŻYTKOW OBJECT? <i>Andrew D. Vanture, Daniel Zucker, &amp; George Wallerstein</i>	932
THE BROADBAND POWER SPECTRA OF X-RAY BINARIES <i>Rudy Wijnands &amp; Michiel van der Klis</i>	939
THE THERMAL X-RAY SPECTRA OF CENTAURUS X-4, AQUILA X-1, AND 4U 1608-522 IN QUIESCENCE <i>Robert E. Rutledge, Lars Bildsten, Edward F. Brown, George G. Pavlov, &amp; Vyatcheslav E. Zavlin</i>	945
APPLICATION OF REALISTIC MODEL ATMOSPHERES TO ECLIPSE MAPS OF ACCRETION DISKS: THE EFFECTIVE TEMPERATURE AND FLARE OF THE DISK IN THE DWARF NOVA Z CHAMAELONTIS <i>Edward L. Robinson, Janet H. Wood, &amp; Richard A. Wade</i>	952
RESTORATION AND PHOTOMETRY OF FULL-DISK SOLAR IMAGES <i>Stephen R. Walton &amp; Dora G. Preninger</i>	959
THE SEARCH FOR SOLAR GRAVITY-MODE OSCILLATIONS: AN ANALYSIS USING ULYSSES MAGNETIC FIELD DATA <i>David G. T. Denison &amp; Andrew T. Walden</i>	972
ACOUSTIC IMAGING IN HELIOSEISMOLOGY <i>Dean-Yi Chou, Hsiang-Kuang Chang, Ming-Tsung Sun, Barry LaBonte, Huei-Ru Chen, Sheng-Jen Yeh, &amp; The TON Team</i>	979
HEATING AND ACCELERATION OF THE SOLAR WIND VIA GRAVITY DAMPING OF ALFVÉN WAVES <i>Iolanda Cuseri, Dermott Mullan, Giancarlo Noci, &amp; Giannina Poletto</i>	989
NEW INSTRUCTIONS TO AUTHORS—REVISED 1997 JUNE 1	i